

# Medical Use and Emergency Response

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*“The only thing more powerful  
than all the armies of the world is  
an idea who time has come.”*

- Victor Hugo

Crash every five seconds  
Injury every 15 seconds  
Death every 13 minutes



Deaths: 42,116  
Injuries: >3,000,000



Costs:

- \$.5 billion per day
- \$230 billion annually

# Medical Community Uses

- **Prospective** - *Saves lives directly*
  - quickly accessible to medical personnel at the **scene of a crash**
  - Used to assess likelihood of injury, make triage decisions
- **Retrospective** - *Saves lives indirectly*
  - improve system triage and treatment protocols
  - “make system more efficient, less costly, and better match system resources to patient needs.”
  - Injury research

# EMS Maxims

- It's a system.
- Time is tissue.
- Get the *right* patient to the *right* place at the *right* time.



# Trauma Triage

- Physiologic criteria
- Anatomic criteria
- Mechanism of Injury
  - Vast majority determined by MOI.
  - Very inefficient: over and under triage



# Notable Quotes

“The emergence of crash data plays a strong role in the development and integration of emergency medical service systems.”

- *NAEMSP*

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“More accurate crash information would allow better injury prediction and help guide diagnostic and therapeutic decisions.”

“Measured crash direction and force data can markedly improve injury prediction, algorithms, biomechanics, cost of injury research, and identification of problem injuries.”

- *ACEP*

# Key Entities Supporting Types of EDR Variables

- 1 - **American College of Surgeons (ACS)**, Resources for Optimal Care of the Injured Patient
- 2 - **National Association of EMS Physicians (NAEMSP)**
- 3 - **American College of Emergency Physicians (ACEP)**
- 4 - **ITS America, Medical Subcommittee** - includes representatives from the National Association of EMS Physicians, National Association of EMS State Directors
- 5 - **NHTSA EDR Work Group**
- 6 - **Garthe Associates** - papers and presentations to NHTSA EDR WG and the Massachusetts Chapter of the American College of Surgeons
- 7 - **William Lehman Injury Research Center**
- 8 - **University of Alabama Center for Injury Sciences**
- 9 - Presentations to IEEE MVEDR WG by Garthe, Martinez, Mango: July and Dec 2002, Feb 2003



# Medical Use Variable List

## Crash Descriptor Info.

location (Long/Lat)      time      date      VIN

## Crash Severity Info.

deceleration time history\*

direction of force (DOF)

\* the time history allows the computation of other variables including delta V, crash pulse and if 3 axis, DOF

## Restraint Use Info ( each seat position)

restraint use

deployment of air bag(s)

## Other

number of occupants\*\*

rollover\*\*\*

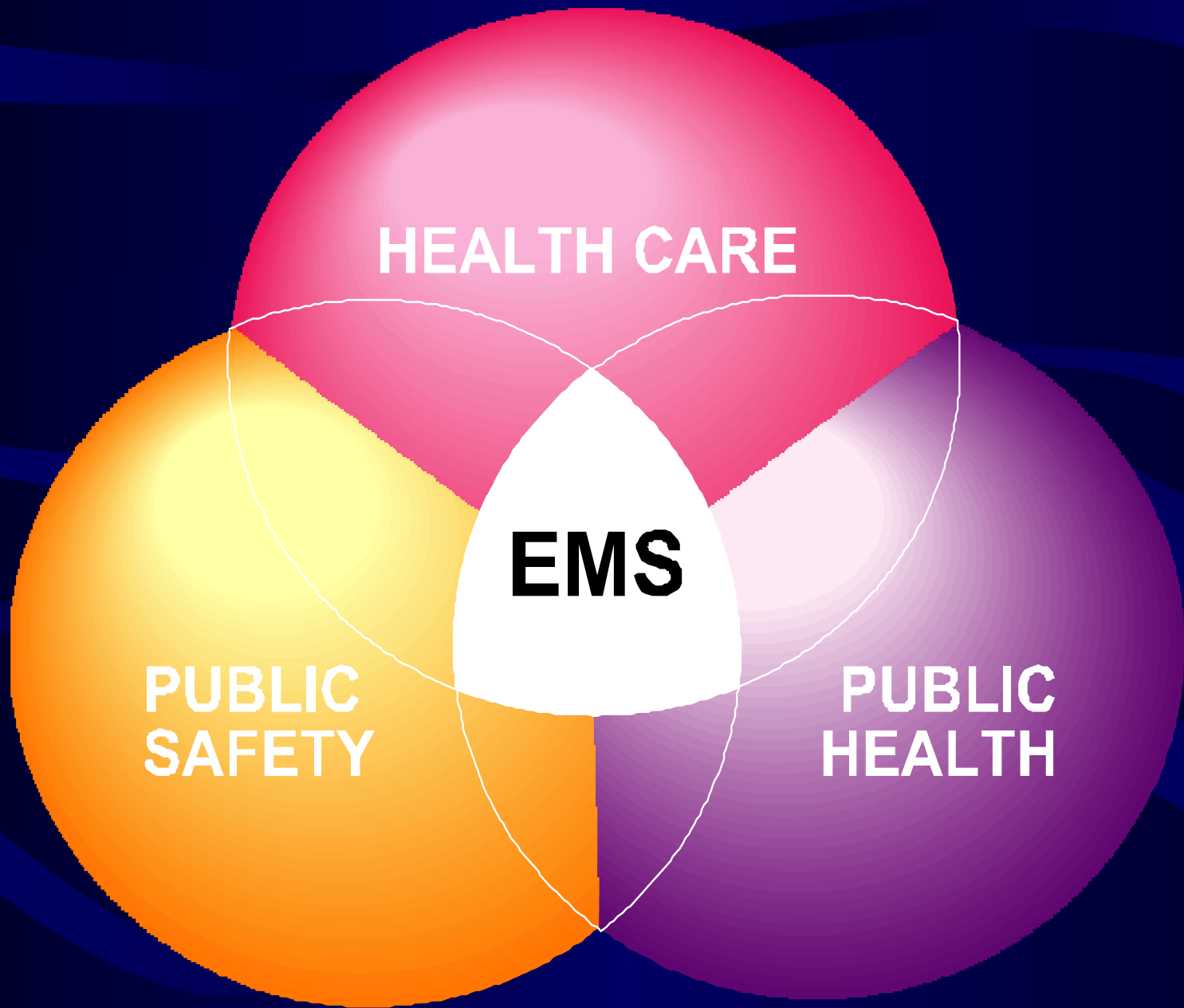
\*\* allows computation of ejection

\*\*\* might also be computed from direction of force



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AGENDA FOR THE FUTURE



# Recommendations for ITS Technology in EMS



# Recommendations

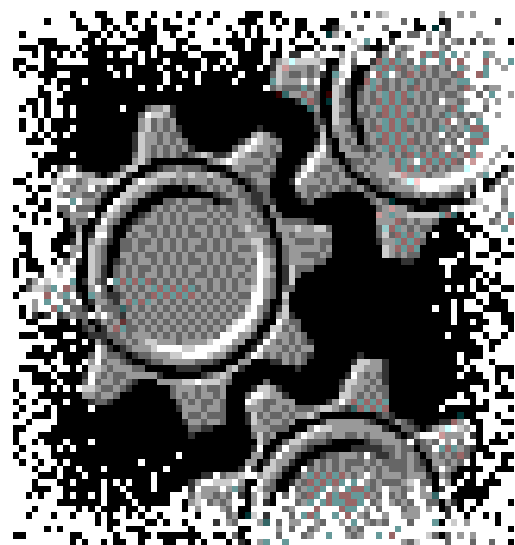
- **Priority issue** - Huge opportunity to reduce morbidity and mortality, improve EMS response
- **Wireless E-911 essential**
- **Strong support for ACN** and current telematics providers – guidance for improvement
- **Technology should meet emergency provider's needs and integrate into existing systems— *not the other way around***
- Needs **strong medical involvement** early on

# Guidance for ACN

- Meaningful subset of all data
- Minimum standard for data set, format
- Critical crash info should arrive thru the “front door” with little or no delay
- Interoperable communications

# Urgency Algorithm

# How does URGENCY Work?



- Predicts Probability of Serious Injury
- Based on Logistic Regression Analysis with Weighting Factors
- Applied to NASS Data



# URGENCY Variables (Partial)

## Frontal Crash + 5 Predictors

Delta V, Mph	21
Air Bag + Belt	Yes
Vehicle Weight, lb.	2500
Occupant Age	30
Occupant Gender	Male

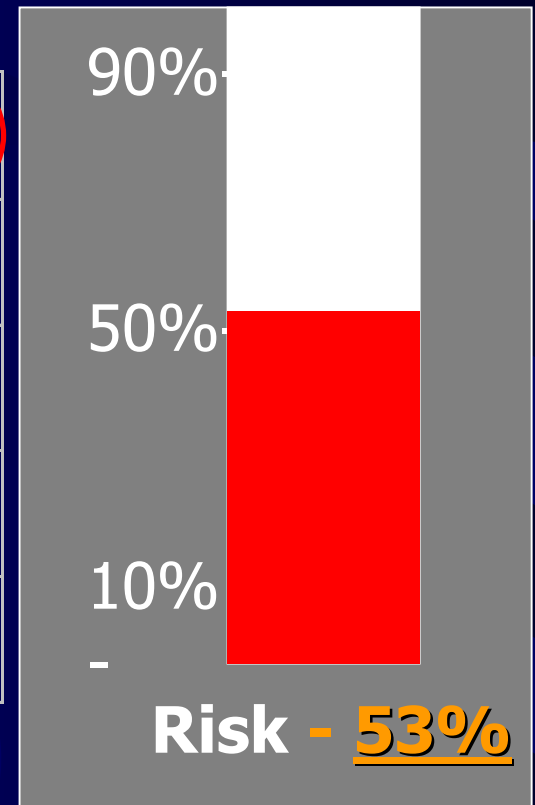
# URGENCY Presentation

Higher Delta-V

Delta V, Mph	35
Air Bag + Belt	Yes
Vehicle Weight, lb.	2500
Occupant Age	25
Occupant Gender	Male

Examine Older Occupant – 70 YO

Prediction



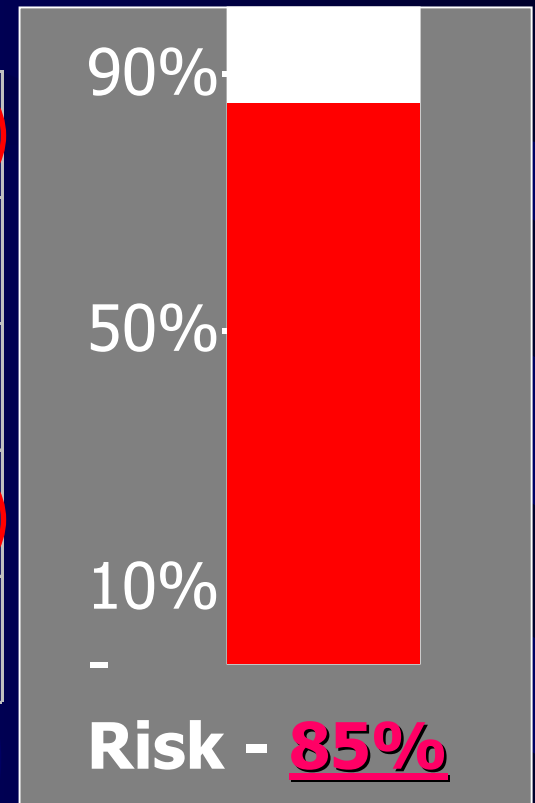
# URGENCY Presentation

## Older Occupant

Delta V, Mph	35
Air Bag + Belt	Yes
Vehicle Weight, lb.	2500
Occupant Age	70
Occupant Gender	Male

**Examine Unrestrained Occupant**

## Prediction

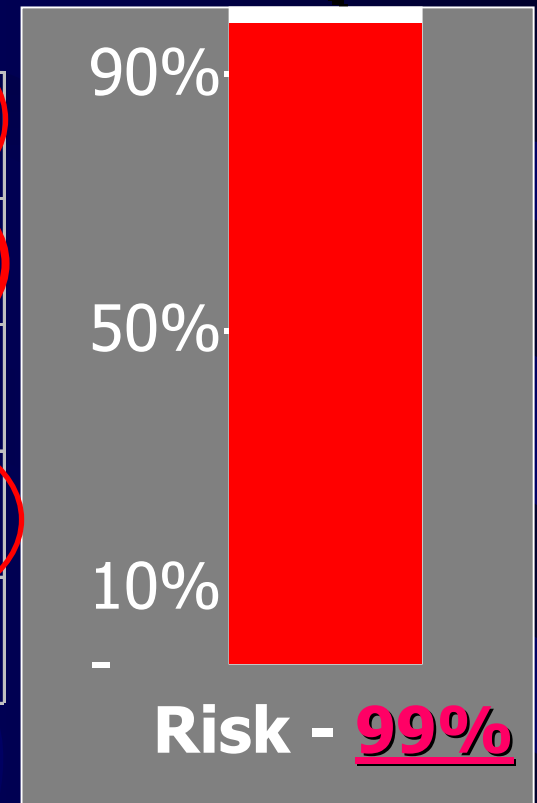


# URGENCY Presentation

No Restraint

Delta V, Mph	35
Air Bag + Belt	No
Vehicle Weight, lb.	2500
Occupant Age	70
Occupant Gender	Male

Prediction



# *The Road Ahead...*

